SECTION 02432
STORM SEWER MANHOLES AND INLETS

PART 1 - GENERAL

1.1 SUMMARY

A. This section applies to manholes for the storm drain system. All manholes shall be precast or monolithic concrete with eccentric cones unless otherwise approved by the construction manager (CM).

1.2 RELATED DOCUMENTS

A. Refer to other sections for items affecting manholes. Coordinate this work with that specified by other sections for timely execution.
B. Drawings and general provisions of the contract, including General and Supplementary Conditions apply to this Section.

1.3 SUBMITTALS

A. Shop drawings are required for castings, monolithic concrete, and precast manholes components specified in this section.
B. Submit shop drawings for all products specified in this section in accordance with the requirements of General and Supplemental Conditions.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY

A. Reinforced or plain, meeting the applicable requirements of Section 03300, Cast-in-Place Concrete.

2.2 MORTAR

A. Composed of one part Portland cement and two parts sand (volumetric measure) thoroughly mixed in a tight box, with water added gradually and mixed continually until mortar has attained the proper consistency for use in brick masonry; prepared only in such quantities as needed for immediate use; mortar mixed for more than 30 minutes, retempered, or previously set will not be allowed.

2.3 GRAY IRON CASTINGS

A. Cast iron conforming to the requirements of Class 30, ASTM A48; made accurately to the required dimensions; sound, smooth, clean, and free from blisters and other defects; not plugged or otherwise treated to remedy defects; machined so that covers rest securely in the frames with no rocking and are in contact with frame flanges for the entire perimeter of the contact surfaces; thoroughly cleaned subsequent to machining and, before rusting begins, painted with a bituminous coating so as to present a smooth finish; tough and tenacious when cold, but not tacky and with no tendency to scale; and with the actual weight in pounds stenciled or printed by the manufacturer on each casting in white paint. The actual cover design shall incorporate the ORNL logo as indicated on the drawings.

B. Actual weight in pounds stenciled or printed by the manufacturer on each casting in white paint.

C. The clear opening in the frame casting shall not be less than 24 inches, and the cover shall weigh not more than 180 pounds. Castings shall be heavy duty type, John Bouchard & Sons Company, No.1150; Neenah Foundry Company, No. R1642, Vulcan Foundry No. VM1312, or equal.

D. Watertight casting shall conform to the above specifications, but shall also be furnished with a neoprene O-ring gasket and countersunk stainless steel bolts to form a watertight seal between the cover sealing surface and the frame.

2.4 LADDER BARS

A. An aluminum alloy weighing 2.2 each pounds or 3/8 inch minimum steel reinforced rod encapsulated in polypropylene plastic.

2.5 PRECAST MANHOLE COMPONENTS

A. Meeting the requirements of the standard drawings and ASTM C478 with a minimum compressive strength of 4,500 psi. Manhole barrels shall conform to the requirements of ASTM C76, Class III, with wall thickness B, Type II cement. The manhole sidewall shall be of a length such that the top of the manhole is achieved with a tolerance of – 0-foot to +1-foot. The outside of the manhole barrel shall be sealed with a water resistant bituminous seal coat.

2.6 NONSHRINK GROUT

A. Euco NS by the Euclid Chemical Company or and Masterflow 713 by Master Builders. The grout shall conform to CRD-C-621-80, "Corps of Engineers Specification for Nonshrink Grout."

2.7 PLASTIC GASKET FOR PRECAST MANHOLE SECTIONS USED AS DETENTION POND OUTLET STRUCTURE RISERS

A. Preformed plastic gasket shall meet or exceed all requirements of FS SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints," Type I, rope form. The sealing compound shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. It shall be supplied in extruded rope form of suitable cross section and in such sizes as to seal the joint space when the pipes are laid. Use two complete ropes at each joint. The sealing compound shall be protected by a suitable removable two piece wrapper, which shall be designed so that half may be removed longitudinally without disturbing the other half in order to facilitate application of the sealing compound. The flexible plastic gasket shall also meet the requirements of the following table:

Composition	Test Method	Minimum	Maximum
Bitumen (Petroleum Plastic Content)	ASTM D4	50	70
Ash Inert Mineral Matter	AASHO T111	30	50
Volatile Matter	ASTM D6	--	2.0

Property	Test Method	Minimum	Maximum
Specific Gravity at 77 degrees F	ASTM D71	1.20	1.30
Ductility at 77 degrees F (cm)	ASTM D113	5.0	------
Softening Point	ASTM D36	320^{o} F	------
Penetration 77 degrees F (150 gms) 5 sec.	ASTM D217	50	120

2.8 MATERIAL TESTING

A. All precast reinforced concrete manhole risers and tops specified herein shall be tested and inspected by an commercial testing laboratory approved by the CM prior to delivery to the site, and all materials that fail to conform to these specifications shall be rejected. After delivery to the site, any materials that have been damaged in transit or are otherwise unsuitable for use in the work shall be rejected and removed from the site. Supply certified copies in duplicate of the inspection and acceptance reports of the testing laboratory of the CM before using the materials. The commercial testing laboratory shall be engaged and paid for by the Contractor. Submit a certificate from the manufacturer of the castings indicating that they meet all applicable requirements of these specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. Dewater sufficiently to maintain the ground water level at or below the bottom of the manhole foundation prior to and during placement of the foundation.

B. Obtain an adequate foundation for all manhole structures by removing and replacing unsuitable material with well graded granular material, by tightening with coarse rock, or by such other means as provided for foundation preparation of the connected sewers or as directed by the CM. Wherever water is encountered at the site, place all cast in place bases or monolithic structures on a one-piece waterproof membrane to prevent any movement of water into the fresh concrete.

C. When the foundation subgrade has been prepared and is approved by the CM, carefully construct the concrete foundation for monolithic manholes to the line and grade required by the drawings. Construct the manholes after the concrete foundation has been allowed to set for a period of not less than 24 hours.

D. For precast manholes, carefully block the base section above the prepared surface so that it is fully and uniformly supported in true alignment; make sure that all entering pipe can be inserted at proper grade. Then place the concrete foundation and invert under and upon this base section as shown in the standard drawings. A base section with monolithic foundation (bottom) may be used when approved by the CM.

E. Thoroughly wet and then completely fill all lift holes and all joints between precast elements with mortar. Smooth and paint them both inside and outside to ensure watertightness. Coat all joints and touchup all scarred areas on the bituminous seal coat.

F. Construct monolithic concrete manholes and bases of 4,000 psi concrete in accordance with the provisions of this section and applicable provisions of Section 03300, Cast-in-Place Concrete. The ladder bars shall be cast in place. The inside and outside of the manhole barrel shall be sealed with a water resistant bituminous seal coat.

G. Carefully set the cast iron frame for the cover at the required elevation, and properly bond it to the masonry with cement grout and/or anchor bolts.

H. Manhole inverts shall be constructed of concrete or Portland cement mortared masonry fill and may, at the Contractor's option, be covered with cement mortar to the approximate cross section of the sewers connected to them. Make any necessary changes in cross sections gradually from side to side of the manhole; make changes in direction of flow of the sewers to a true curve of as large a radius as is permitted by the size of the manhole. Construct brick inverts with the brick laid on edge and longitudinally with the invert channel. Inside face joints shall be not more than 1/4 inch thick.

I. Seal all pipe entries into manholes with CM approved non-shrink grout.

J. Place backfill by hand around the manhole and to a distance of at least one pipe diameter into each trench, and tamp with selected material up to an elevation of 12 inches above the crown of all entering pipes. Continue backfilling in accordance with the requirements for trench backfilling shown on the Drawings.

END OF SECTION 02432